



Installation and Operating Instructions

WARNING! DANGER!

READ BELOW BEFORE STARTING PUMP! FAILURE TO HEED THESE WARNINGS MAY RESULT IN AN ACCIDENT CAUSING PHYSICAL DAMAGE, SERIOUS PERSONAL INJURY OR DEATH!

1. Read and understand tags and installation and operating instructions.
2. Always use caution near rotating parts including the drive system for the pump.
3. Install proper guard(s). Never operate pump without guard(s) in place.
4. Open all lines before starting pump.
5. Know operating conditions.
6. Do not operate this equipment in excess of its rated capacity, pressure, speed, and temperature, or other than in accordance with instructions contained in the installation and operating instructions.
7. Install and properly set relief valve.
8. Proper measures and precautions must be taken to avoid spillage and overflow from overfilling or over pressurization of any component of the system including the receiver and lines.
9. Pumps should not be mounted and/or suspended by the ports unless specifically designed for it or authorized by Roper Engineering

Correctly installed, operated and maintained, your Roper pump will give long dependable service. Remember... faulty selection and installation form the basis for more pump troubles than all other causes combined... no amount of maintenance can compensate for selection and installation mistakes. Read these instructions carefully before installing and operating this pump.

This pump is satisfactory for the conditions for which it is rated, but its operation in excess of these conditions may subject it to stresses and strains which it is not designed to withstand.

It is recommended that appropriate coupling or belt guards be installed for the protection of personnel.

These instructions will cover standard pumps and most spec number pumps. Appearance may vary among pumps and construction may vary on spec number pumps.

If there is any question concerning the ratings or instructions, please contact a distributor, district representative, or the home office of the: ROPER PUMP COMPANY, Commerce, GA 30529. Phone 706-335-5551

ROPER PUMP COMPANY
COMMERCE, GEORGIA 30529

ADDITIONAL IMPORTANT WARNINGS AND INFORMATION

1. These instructions cannot possibly cover every situation concerning the operation, inspection, adjustment and test of the equipment furnished. Roper Pump Company, in furnishing this equipment and these instructions, must presume that the operating and maintenance personnel using this equipment have sufficient technical knowledge and experience to apply sound safety and operational practices which may not be otherwise mentioned.
2. These pumps are general purpose pumps for a wide range of applications; and it is, therefore, not practical to include performance or maximum ratings in these instructions. Standard ratings are contained in Roper Pump Company sales brochures for the type of pump involved. If you do not have ratings or performance characteristics for your installation and pump, they can be obtained by contacting a Roper distributor, representative, or Roper Pump Company.
3. In applications where Roper furnished equipment is to be integrated with a process or other equipment, these instructions should be thoroughly reviewed to determine the proper integration of the equipment into the overall plant or system operational procedures.
4. Roper Pump Company does not supply, recommend, or approve the various systems in which its pumps are or may be used. Unless designed, manufactured, and used properly, various systems may be inherently unsafe or dangerous. The user should check and comply with all federal, state and local regulations and other regulations and recommendations such as: NFPA, UL, API, OSHA, etc.

In particular, the user must check the pumped liquid characteristics and take proper precautions. Among other things, consider the following:

- A. Determine consequences of spillage or leakage (all pumps or systems may fail sometime).

_____ Explode
_____ Toxic
_____ Corrode
_____ Fire
_____ Chemical Burn
_____ High Temperature
_____ High Pressure
_____ Other

- B. Have Appropriate safeguards been used?

_____ Temperature Controls
_____ Pressure Controls
_____ Leak Detectors
_____ Shutoff Devices
_____ High or Low Pressure Safeguards
_____ Alarm Devices
_____ Overfill or Overflow Detection
_____ Have all possible methods and sequences
of failure been considered?
_____ Are there any other methods needed to
control a hazard?
_____ Inspection for wear and/or deterioration
of components.

Identify all possible hazards. Determine what controls are needed. Only you, the user, understands your product and system characteristics fully. The ultimate responsibility for the application and safety is with you.

5. The possibility of fire and burns from flammable or hot liquid spillage from ruptured hoses should particularly be noted and proper precautions taken.
6. Exposed rotating parts of the drive to pump should be properly guarded.

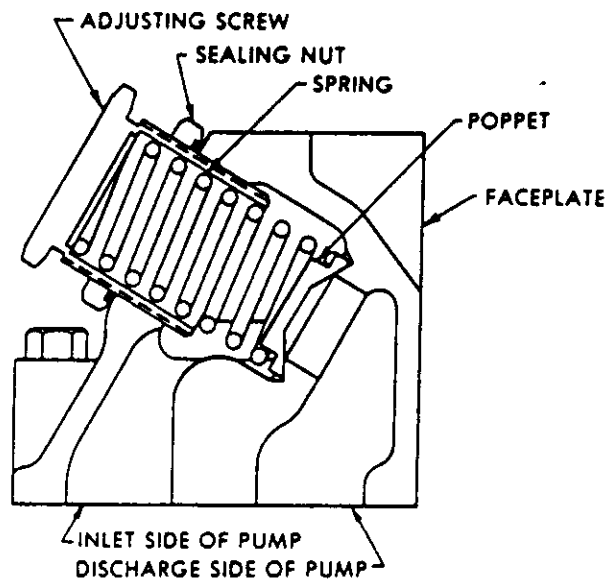
7. On all pumps it is recommended that a relief valve (either a built-in valve or an external valve in the line) be used to protect the equipment and personnel from accident due to overpressure. FOR A PUMP EQUIPPED WITH A BUILT-IN RELIEF VALVE, SEE SECTION(S) ON RELIEF VALVES BEFORE OPERATING PUMP. READ SECTION ON PRE-OPERATION CHECKS, ESPECIALLY FOR A PUMP WITH NO BUILT-IN RELIEF VALVE.

If the pump is purchased with a built-in relief valve, it must be properly installed and set by the user to protect the pump. This relief valve is a safety device. It should not be used as a control device to regulate pressure. Further consideration must be given by the user as to whether the built-in relief valve is adequate to protect the system and personnel. If any part of the system is inadequate or could become inadequate through deterioration, wear, abuse, etc., such as hoses, the built-in relief valve may not give protection. An external relief valve, sized, provided, installed, and set by the user may be required to protect the system.

8. Certain system conditions such as sudden opening or closing of inlet or outlet valves, etc., can result in high transient (short time) pressure pulses which exceed the built-in relief valve setting. The user is responsible for determining the system characteristics and providing hose, pipe, fittings, etc., adequate for these conditions.
9. Spillage or overflow from overfilling or overpressurization of any component of a system incorporating this pump may result in an accident. Proper measures and precautions must be taken to avoid spillage or overflow from overfilling or overpressurization of any component of the system including the receiver and lines.

Roper Pump Company continually updates its instruction books, therefore, you should periodically request an updated book or check that you have the latest.

Prior to starting pump see PREPARATION OF FOUNDATION-BASEPLATE MOUNTED PUMPS, ALIGNING DRIVER AND PUMP, INSTALLATION OF PIPES, and PRE-OPERATION CHECKS sections in the back of this book.



The relief valve must be positioned as shown in instructions for direction of rotation – otherwise the valve is inoperable and will not give protection.

If the built-in relief valve is used it is mandatory that the relief valve be set BY THE USER, since maximum relief valve pressure depends upon the viscosity and specific gravity of the liquid, the flow rate (Pump RPM), and also the initial relief valve setting. If not specified otherwise the relief valve on this pump is factory set for full by-pass at a differential pressure of 300 PSIG, at a pump speed of 1800 RPM, on liquid with a viscosity of approximately 150 SSU. This setting would only apply if all these conditions are duplicated.

Built-in relief valves sense differential pressure only (Difference between inlet and outlet pressures).

Warning: Take precautions necessary to prevent personal injury or physical damage that could be caused by any loss of the product being pumped while adjusting relief valve.

DO NOT adjust relief valve without all guards in place.

To adjust the relief valve, loosen the sealing nut. Turn adjusting screw clockwise to increase pressure and counterclockwise to decrease pressure. Make adjustments in $\frac{1}{2}$ turn increments until desired pressure is obtained. Tighten sealing nut.

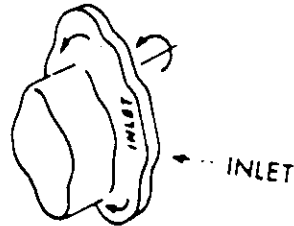
To replace spring and/or poppet, loosen the sealing nut. Carefully remove adjusting screw making sure that spring pressure does not force adjusting screw out too rapidly. Remove spring and poppet. After checking parts and replacing, if required, insert poppet and spring in faceplate. Install sealing nut and adjusting screw and adjust relief valve pressure as described above.

A built-in relief valve should not be used on applications where the discharge must be closed for more than a few minutes. Prolonged operation with the relief valve fully by-passing will cause heating of the liquid circulating thru the valve, thus resulting in possible damage.

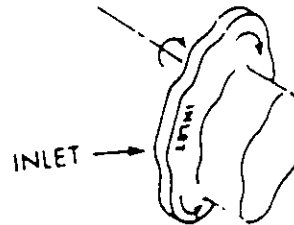
DIRECTION OF ROTATION
(AS DETERMINED FROM DRIVE END OF PUMP)

HI-DRIVE

CLOCKWISE



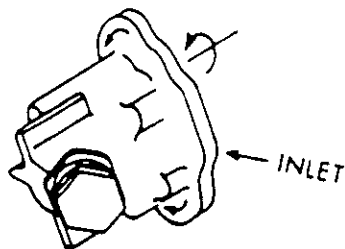
COUNTERCLOCKWISE



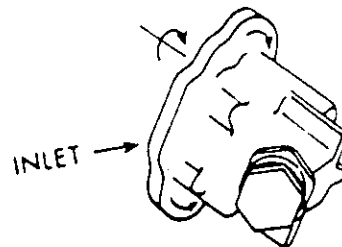
PLAIN

CAST LETTERS "INLET" MUST BE ON INLET
SIDE OF PUMP

CLOCKWISE



COUNTERCLOCKWISE



RELIEF VALVE

RELIEF VALVE ADJUSTING SCREW MUST BE
ON INLET SIDE OF PUMP

PRIOR TO OPERATING THE PUMP, MAKE SURE THE SHAFT ROTATION, PIPE CONNECTIONS AND FACEPLATE POSITION ARE IN ACCORDANCE WITH THE ABOVE ILLUSTRATIONS AND THE FOLLOWING INSTRUCTIONS.

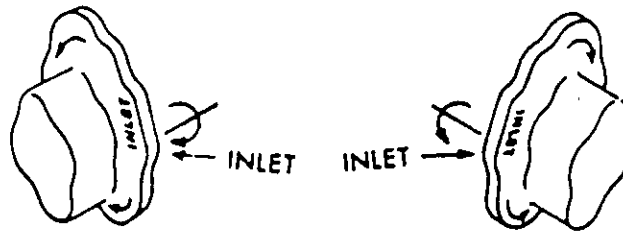
For inlet pressures over 25 PSIG, consult a distributor, district representative, or the home office of the ROPER PUMP COMPANY, COMMERCE, GEORGIA.

DIRECTION OF ROTATION
(AS DETERMINED FROM DRIVE END OF PUMP)

LO-DRIVE

COUNTERCLOCKWISE

CLOCKWISE

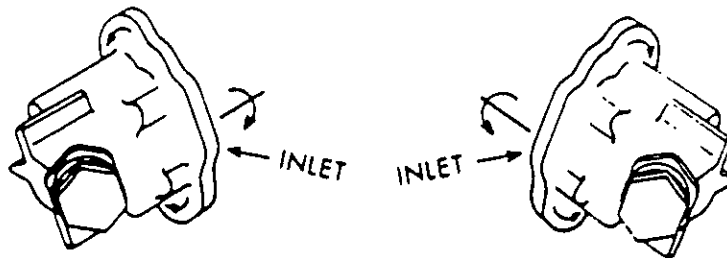


PLAIN

**CAST LETTERS "INLET" MUST BE ON INLET
SIDE OF PUMP**

COUNTERCLOCKWISE

CLOCKWISE



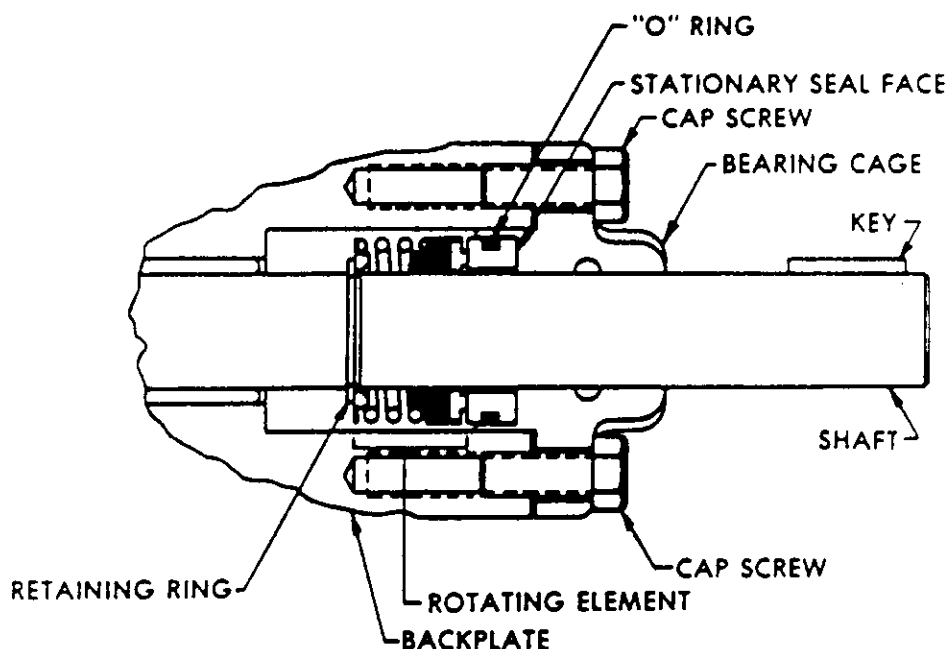
RELIEF VALVE

**RELIEF VALVE ADJUSTING SCREW MUST BE
ON INLET SIDE OF PUMP**

RELIEF VALVE FACEPLATE: All pumps with a relief valve faceplate must have the faceplate positioned as shown above.

To reverse rotation, remove cap screws and/or nuts (securing faceplate) and faceplate, taking care not to damage gaskets or o-rings. Turn faceplate, as well as flanged bearing bushings, 180° from present position and replace on pump. Dowels will locate parts in proper position. Tighten cap screws and/or nuts.

MECHANICAL SEAL



Mechanical seals do not require adjustment. Leakage developed at the seal may be due to one of the following conditions; worn, marred, or cracked rotating or stationary seal face, or bellows that has become hard, soft, cracked, expanded or extruded.

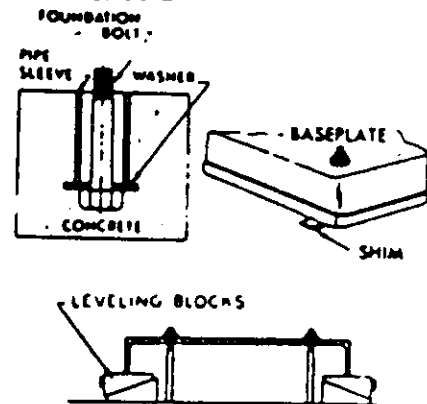
When replacing or servicing a mechanical seal take particular care not to mar or scratch the sealing surfaces or injure the bellows. If the seal has been used, do not put it back into service unless both sealing surfaces are perfectly flat and smooth.

To replace the mechanical seal, remove the key, cap screws, bearing cage, and the stationary seal face. Remove burrs and sharp edges from the end of shaft and keyway and clean the shaft.

To reassemble the mechanical seal, lubricate with a light machine oil the section of the shaft over which the seal is to be mounted. Slide the rotating element onto the shaft. Be sure it is properly positioned against the retaining ring. After checking the stationary seal face and o-ring, and replacing, if required, coat the sealing surface with light machine oil. Install bearing cage and gasket and secure with cap screws.

PREPARATION OF FOUNDATION-BASEPLATE MOUNTED PUMPS

A good foundation is of major importance. Concrete is best, since it is heavy enough to support the baseplate rigidly and absorb strain and shock. Baseplate units must be securely bolted in position, with shims or leveling wedges to correct any angular and-or parallel misalignment. Such misalignment will cause the pump or driver to be out of alignment, thus resulting in heavy stresses on the pump. Accelerated wear or vibration can be caused by a very slight misalignment.



PLACE STRAIGHT EDGE AT TOP, BOTTOM, AND BOTH SIDES TO CHECK ALIGNMENT OF COUPLING MEMBERS	
Correct	
Parallel Misalignment	
Angular Misalignment	

ALIGNING DRIVER AND PUMP

Driver and pump units are factory aligned before shipment, but they must be accurately realigned during and after installation.

To align coupling, use a straight edge and feeler gauges to check for parallel and angular alignment as shown in illustration at left.

Check the alignment at every step during installation: after the unit is mounted on foundation, after piping has been secured, and after pump has run with the liquid at operating temperature. **DO NOT DEPEND ON FLEXIBLE COUPLINGS TO COMPENSATE FOR MISALIGNMENT.**

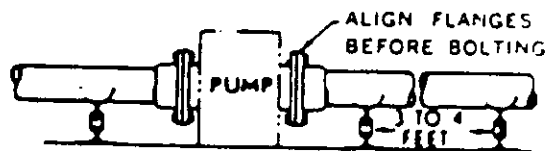
INSTALLATION OF PIPES

Use of teflon tape for installing pipes may cause damage to pump. PIPING MUST BE CHECKED CAREFULLY, ALLOWING FOR EXPANSION OR CONTRACTION. Pipe strain can distort the pump components, thus increasing wear, causing bearing misalignment, or breaking parts. Pipe supports and expansion joints should be used to avoid weight and stresses on the pump. See that flanges or unions fit without forcing.

Pump port size does not necessarily establish correct pipe size. If in doubt as to pipe size to use, check with a Roper Distributor or District Representative. It is recommended that the pump be installed below the liquid level, with a short, large diameter supply line to assure a flooded inlet. Roper pumps, however are self-priming, positive displacement pumps and will prime under the most difficult conditions. Roper pumps are recommended for clean liquid only. A strainer, of ample size and regularly cleaned, should be used in the inlet piping to prevent foreign material from entering the pump.



ALIGN HALVES OF UNION BEFORE TIGHTENING



CHECKING PUMP PERFORMANCE

A summary of the causes of common malfunctions.

NO LIQUID DELIVERED

1. Pump not primed. If pump fails to deliver liquid after a minute, stop the pump and prime it by pouring some liquid into the discharge side of the pump.
2. Rotating in wrong direction.
3. Inlet lift too high. Check this with gauge at pump inlet.
4. Clogged inlet line.
5. Air pockets or vapor lock.
6. Air leaks in inlet line.
7. Foreign matter under valve seat or poppet. Remove and clean poppet and valve seat. Caution: if poppet or seat is damaged it must be remachined or replaced.

RAPID WEAR

1. Abrasives in liquid.
2. Compatibility of liquid and pump material.
3. Excessive pressure.
4. Non-lubricating liquid.

EXCESSIVE NOISE

1. Starved pump.
2. Air leaks in inlet line.
3. Air or gases in liquid.
4. Pump speed too high.
5. Relief valve chatter. Check pressure setting.
6. Improper mounting. Check alignment thoroughly. See instructions for aligning driver and pump and preparation of foundation for baseplate mounted pumps.

INSUFFICIENT LIQUID DELIVERED

1. Air leaks in inlet line.
2. Air leaks through packing or mechanical seal.
3. Speed too slow.
4. Excessive lift at inlet. Check this with gauge at the pump inlet.
5. Viscosity of liquid too high for size and length of inlet pipe.
6. Foot valve or end of inlet pipe not immersed deeply enough in liquid.
7. Foot valve, if used, too small, stuck, or not working properly.
8. Partial air pockets or vapor lock.
9. Pump damaged by foreign matter or misalignment.
10. Excessive clearance in pump caused by wear or corrosion.
11. Relief valve set too low, or stuck partially open.

PUMP TAKES TOO MUCH POWER

1. Speed too high.
2. Liquid more viscous than previously anticipated.
3. Operating pressure higher than specified. Check this with gauge at the pump outlet.
4. Outlet line obstructed.
5. Mechanical defect, such as bent shaft, packing gland too tight, or misalignment of piping.
6. Relief valve not operating properly.

SAFETY PRECAUTIONS

Safe installation, operation and maintenance must be performed by qualified personnel. Do not work on pump while it is running, except for minor necessary adjustments to the relief valve, provided proper guarding of all rotating parts is in place. Be careful when working on or near a running pump, contacting or being caught in rotating parts could cause serious or fatal injury. Guards should be provided for all exposed rotating parts.

WHEN LIQUID BEING PUMPED IS HAZARDOUS OR VOLATILE, PRECAUTIONS SHOULD BE TAKEN AT ALL TIMES INCLUDING THE RUN IN PERIOD AND DURING DISASSEMBLY AND ASSEMBLY OF PUMP.

PRE-OPERATION CHECKS

See instructions on Preparation of Foundation for Base Mounted Pumps, Aligning Driver and Pump, and Pipe Installation.

Determine the proper direction of rotation by using the appropriate instructions and illustrations. When a relief valve is used, make sure it is positioned and adjusted properly. Check the rotation of the driver to make sure it will operate the pump in the desired direction of rotation.

After the unit is mounted and the piping is connected, the pump should be checked to be sure it operates freely, without binding. After operation is proved satisfactory, both pump and driver should be tightly secured and the alignment rechecked before operation.

Before starting, make sure the inlet and discharge valves are open and there is liquid in the pump.

After starting the unit, check to see that the pump is delivering liquid. If not, stop the driver immediately and refer to the section on Checking Pump Performance. If the pump is delivering liquid, check the unit for quiet operation, vibration, localized heating, and excessive seal or packing leakage. It is recommended the pressure and-or vacuum be checked by installing gauges at both sides of the pump to make sure the pressure and-or vacuum conform to specifications.

IF THERE IS NO RELIEF VALVE IN THE SYSTEM NEVER BLOCK THE OUTLET LINE. HIGH PRESSURE WILL OCCUR, RESULTING IN POSSIBLE DAMAGE OR BREAKAGE TO THE PUMP OR SYSTEM PARTS AND POSSIBLE INJURY TO PERSONNEL. EVEN WITH A RELIEF VALVE IN THE SYSTEM, DO NOT OPERATE THE PUMP FOR MORE THAN A FEW MINUTES WITH THE OUTLET LINE BLOCKED. RAPID HEATING AND POSSIBLE DAMAGE WILL OCCUR.

REPAIR PARTS

Use only Roper repair parts. Roper Pump Company takes no responsibility for the use of parts other than those manufactured and supplied by Roper Pump Company. The use of substitutes may result in poor pump performance or in an accident causing physical damage or injury to personnel.